2018 WMTC

儿童组个人赛第一轮

Junior Level Individual Round 1

1. Known sequence:1, 1, 2, 3, 5, 8, 13, 21, 34, 55, …， starting with three numbers, each number equals the sum of its two preceding ones. How many odd numbers are there in the first 2018 numbers?

2. If (1) x, y, z are different from each other and they are one of 3, 5, 7, respectively.

(2) $\overline{xyz}$ is a three digits number, $2018-\overline{xyz}$ is the multiple of 5.

(3) $2018-\overline{xyz}=a\times b\times c$， a, b, c are the sides of a triangle.

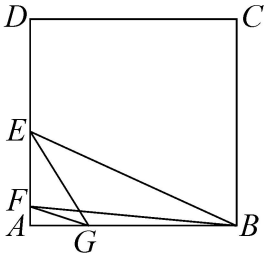
Find the length of largest side of this triangle.

3. Plant trees on both sides of a road, if the distance of any two adjacent trees is 5 meters, there will be 7 trees left; if the distance is 4 meters, 73 trees will be needed.The length of this road is_____meters.

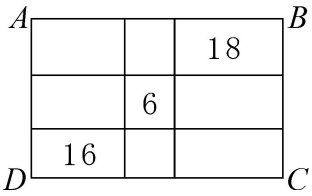
4. The 28 students in Class A went to the library. There are 32 girls in this Class, the girls in this class who didn't go to the library was *M*, and the boy in this class who go to the library was *N*. Find *M*-*N*.

5. *M* is a two digits number, $\frac{M-8}{5\times M+51}$ is a reducible fraction. Find the maximum value of *M*.

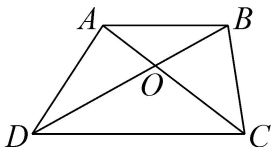
6. In square $ABCD$, the area of triangle BGE is 2000, the area of triangle BGF is 400. Find $EF \times BG$.



7. The rectangular $ABCD$ is divided into 9 different small rectangles. The number in the figure is the circumference of the small rectangles in which it located. Find $AB+BC+CD+DA$.



8. In trapezoid $ABCD$, the sides of $ABCD$ is adjustable, but always satisfy : $AB \parallel CD$, $AB<CD$, if AC and BD intersect at point O. How many pairs the same area triangles are there at most in the graph?



2018 WMTC

儿童组个人赛第二轮

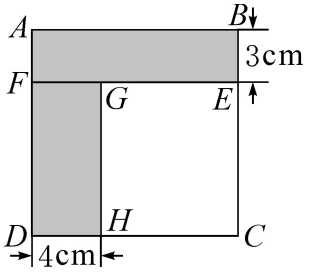
Junior Level Individual Round 2

9. If $\langle x\rangle=\frac{x}{1+x}$, find value of

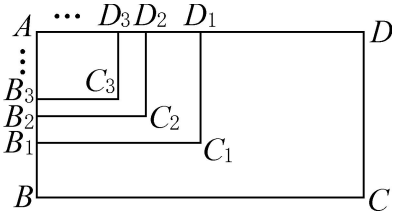
$$\left\langle\frac{1}{2018}\right\rangle+\left\langle\frac{1}{2017}\right\rangle+\cdots+\left\langle\frac{1}{3}\right\rangle+\left\langle\frac{1}{2}\right\rangle+\langle 1\rangle+\langle 2\rangle+\cdots+\langle 2017\rangle+\langle 2018\rangle.$$

10. The three digits $\overline{abc}$ is a prime number, and $a+b+c=14$, if use A and B to represent its maximum and minimum value, then A+B=____.

11. Remove the rectangle $ABEF$ from the square $ABCD$, and remove the rectangle $DHGF$ from the rectangle $ECDF$, if the area of $ABEF$ and $DHGF$ are equal.Find the area of square $ABCD$.



12. In rectangular $ABCD$, $AD=1$, $AD_1=\frac{1}{2}AD$, $AD_2=\frac{2}{3}AD_1$, $AD_3=\frac{3}{4}AD_2$, …, $AD_{n+1}=\frac{n+1}{n+2}AD_n$; $AB=\frac{1}{2}$, $AB_1=\frac{2}{3}AB$, $AB_2=\frac{3}{4}AB_1$, $AB_3=\frac{4}{5}AB_2$, …, $AB_{n+1}=\frac{n+2}{n+3}AB_n$.if the area of $AB_1C_1D_1$, $AB_2C_2D_2$, … are S_1, S_2,…, respectively, the value of $S_1+S_2+S_3+\cdots+S_{10}$ is _____.



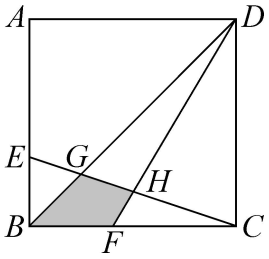
2018 WMTC

儿童组个人赛第三轮

Junior Level Individual Round 3

13.3,4,5,6,7 are five continuous natural numbers. $3+4+5+6+7=25=5^2$, it is a square number. Ask how many arrays like (3,4,5,6,7) within 100?

14. The area of the square *ABCD* is 40, $BE=\frac{1}{3}AB$, and $BF=\frac{2}{5}BC$. Find the area of quadrilateral *BGHF*.



2018 WMTC

儿童组接力赛第一轮

Junior Level Relay Round 1

1-A

There are N people attend a meeting. Everyone should shake hands with the others. If the total number of shake hands is 45. Find N.

2018 WMTC

儿童组接力赛第一轮

Junior Level Relay Round 1

1-B

Let **T** be the number you will receive.

Now, age of my uncle is 2 times of mine. And **T** years later, my age equal to my uncle's age **T** years ago. How old is my uncle now?

2018 WMTC

儿童组接力赛第二轮

Junior Level Relay Round 2

2-A

If a,b,c are prime numbers, and $a^2+b^2+c^2=150$, Find $a+b+c$.

5

2018 WMTC

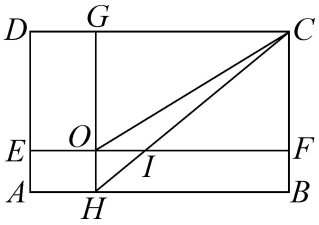
儿童组接力赛第二轮

Junior Level Relay Round 2

2-B

Let **T** be the number you will receive.

In the rectangle *ABCD* , *EF* // *AB*, *GH* // *DA*, *EF* and *GH* intersect at point *O*, *EF* and *CH* intersect at point *I*, and *AH*:*HB*=*AE*:*ED*=1:3, area of triangle *COI* is **T** . Find the area of rectangle *ABCD*.



2018 WMTC

儿童组接力赛第三轮

Junior Level Relay Round 3

3-A

If $C^2 = A^2 + B^2$, and C^2 is a three digits number. Find the maximum value of C^2.

2018 WMTC

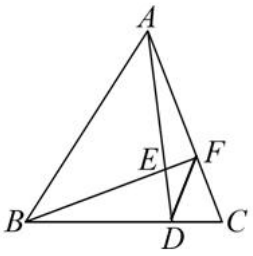
儿童组接力赛第三轮

Junior Level Relay Round 3

3-B

Let **T** be the number you will receive.

In the triangle ABC, $DC=\frac{1}{4}BC$, $FC=\frac{1}{3}AC$, area of triangle ABC is **T**. Find the area of triangle DCF.



2018 WMTC

儿童组团体赛

Junior Level Team Round

1. If $\frac{2020\times2020+2018}{2019\times2019}=\frac{n}{m}$ is a simplest fraction, then $m+n$=_____.

2. When number A divided by 2, the remainder is 1. When it is divided by 5, the remainder is 4. When it is divided by 10, the remainder is_____.

3. 55 same cubes are stacked as shown in Fig.1. Now color the surface（under face is not included） of the whole polyhedron. The number of cubes that are not colored is_____.

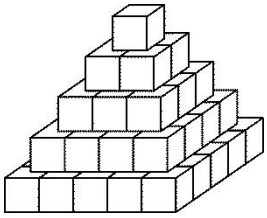


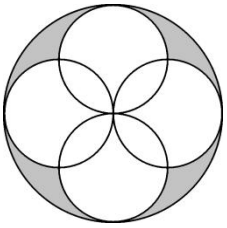
Fig.1

4. $\{x\}$ represents the decimal part of x, then

$$\left\{\frac{2018+1}{5}\right\}+\left\{\frac{2018+2}{5}\right\}+\left\{\frac{2018+3}{5}\right\}+\ldots+\left\{\frac{2018+2018}{5}\right\}=\_\_\_\_\_.$$

5. If x and y are prime numbers, and $x+y=60$. How many pairs of (x,y) are there?

6. In the following graph, there are a big circle and four identical small circles, the diameter of the small circle is 10. Find the area of the shadow.（π=3.14）

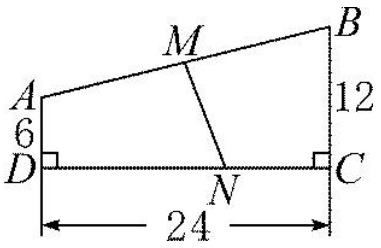


7. Make a big rectangle by 12 small rectangles with no overlap. How many different value of perimeter of the big rectangle?

8. The three digits number $\overline{abc}$ can be divisible by 35, and $a+b+c=12$. How many $\overline{abc}$ are there?

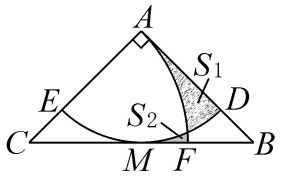
9. How many odd numbers can 2,0,1 and 8 composed?(you can just use several of them and every digit can be used once at a time)

10. In the trapezoidal $ABCD$, $\angle D=\angle C=90°$, $AD=6$,$BC=12$,$DC=24$. M is the midpoint of AB, point N on CD, MN divide the area of $ABCD$ into two equal part. Find DN.



11. a,b,c are different one digit numbers, they can compose 6 three digits numbers, there are at least 2 square numbers. Find the average of 6 three digits numbers.

12. In triangle ABC, $\angle A$=90°, AB=AC, BC=4, take point A as the center of the circle, and the height of the edge BC as the radius draw the arc, it intersect edges AB, AC and CB at point D,E,M. And take the point C as the center of the circle and take the length of AC as the radius, draw arc, intersect CB at point F. S_1,S_2 are different shadow as shown in the Fig.Find $S_1 - S_2$.(use π=3)

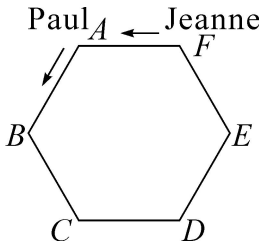


13. $p_1, p_2, p_3, \ldots p_{2018}$ are prime numbers more than 100. If N= $p_1^2 + p_2^2 + \ldots + p_{2018}^2$. When N is divided by 3,what is the remainder?

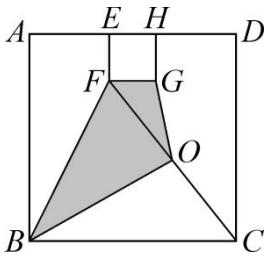
（$p^2 = p \times p$）

14. Suppose $\overline{abc}$ is a three digits number, and $\overline{abc} = \overline{ab} + \overline{bc} + \overline{ca}$, then $a+b-c$ =_____.

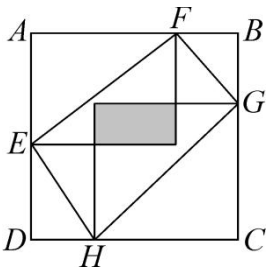
15. $ABCDEF$ is a regular hexagon with length 150 meters. Paul and Jeanne at the same time starting from A and F respectively and walking in the same direction, Jeanne is behind Paul, the speed of Paul is 50 m/min. The speed of Jeanne is 40 m/min. When they walk on the same side of $ABCDEF$ for the first time and at least one person is not at A,B,C,D,E,F. How many minutes have they walked?



16. The square *EFGH* is inside the square *ABCD*. The difference of their area is 200.Point *E,H* on *AD*, point *O* is the midpoint of *CF*. The area of *BOGF*=_____.



17. Point *E,F,G,H* on sides of square *ABCD*,the perpendiculars from these four points to the edges of the *ABCD* form a rectangle (4×2), If *AB*=10, then area of *EFGH* =_____.



18. $\overline{abc}$ is a three digits number, it is a multiple of 36. If $\overline{abc}-\overline{bac}=180$. Then maximum of $\overline{abc}$ is_____.

19. *N* is the multiple of 5, when divided by 6, the remainder is 1; when divided by 8, the remainder is 3. The minimum of *N* is_____.

20. Numbers 1,2,3,4,5,6 are written on 6 ping-pong balls and 6 boxes, respectively. Put the ping-pong balls into boxes, and the number on the box is no more than the number on the ping-pong ball in it. How many methods are there?

2018WMTC Junior Level

Individual Rounds

1	2	3	4	5	6	7
1346	17	800	4	99	3200	40
8	**9**	**10**	**11**	**12**	**13**	**14**
5	$2017\frac{1}{2}$	1090	144	$\frac{5}{12}$	4	3

Relay Rounds

1-B	2-B	3-B
40	256	75

Team Round

1	2	3	4	5	6	7	8	9	10
1347	9	14	807	12	57	4	2	11	16
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
481 或 592	0.5	2	2	63	50	46	972	115	720